CLAIMS

1. A heat-emitting burner element for use with at least one processing device of a fuel cell system performing an endothermic process, e.g., with an endothermic stage of a reforming unit where the burner element consists of at least two plates arranged essentially parallel to each other and at a distance from each other, characterized by the fact that the plates form a reaction gap between themselves and, as a result of the catalytic combustion of a fuel gas/oxygen mixture there on a catalytic coating provided on at least one of the plates and facing the reaction gap, generate heat and emit it by radiation, convection and conduction directly through the coated plate(s) to at least one neighboring endothermic stage and that at least one of the plates displays structural elements also having a catalytic coating and extending into the reaction gap, which runs in the flow direction, which structural elements are if necessary in rows arranged transversely to the direction of flow and offset with respect to each other and consisting, for example, of fins or bars.

2. A burner element as in claim 1, characterized by the fact that the element is essentially four-sided in top view, e.g., square, rectangular or trapezoidal, that the reaction gap displays an inlet and an outlet on the first and second opposite sides of the four-sided element so that the fuel gas/oxygen mixture flows in a flow direction from the inlet on the first side to the outlet on the second side.

3. A burner element as in claim 1 characterized by the fact that the plates forming the reaction gap are of wavelike shape, with the peaks and valleys forming the longitudinal direction of the wave form extending in the flow direction of the fuel gases.

4. A burner element as in claim 3 characterized by the fact that the waveform is a rectangular or square wave.

5. A burner element as in claim 2 characterized by the fact that a device for introducing diluting air transversely to the direction of flow is provided at least in one and preferably in several places along at least one of the also oppositely positioned third and fourth sides of the element.

6. A burner element as in claim 5 characterized by the fact that the device is designed for introducing diluting air in order to introduce it perpendicular to the flow direction of the combustion gases through the reaction gap.

7. A burner element as in claim 5 characterized by the fact that the catalytic combustion chamber defined by the reaction gap is subdivided in the flow direction into several structured sections with the device for introducing diluting air having air openings which in each case are arranged between the neighboring sections following one another.

8. A burner element as in claim 7 characterized by the fact that between two neighboring consecutive sections in each case a distance is provided in the region of the air openings which is at least essentially free of structural elements.

9. A burner element as in claim 8 characterized by the fact that the structured sections display structural elements which bridge the reaction gap between the plates at least essentially completely.

10. A burner element as in claim 7 characterized by the fact that between the two above-mentioned plates on their edge regions, spacers are provided in which or between which the above noted air openings are provided.

11. A burner element as in claim 1 characterized by the fact that the two above-noted plates form on their surfaces facing away from each other a part of an endothermic stage or a reforming unit.

12. A burner element as in claim 11 characterized by the fact that the above-noted surfaces of the plates facing away from each other are also structured and may be coated with a catalyst also.

13. A burner element as in claim 2 characterized by the fact that the inlet communicates with a feed channel for the fuel/oxygen mixture arranged in an edge region on the first side of the element and extending perpendicular to the reaction gap.

14. A burner element as in claim 13 characterized by the fact that the outlet communicates with an outflow channel arranged on the second side of the rectangular element and extending perpendicular to the reaction gap.

15. A burner element as in claim 2 characterized by the fact that the inlet communicates with several feed-in passages which guide the fuel/oxygen mixture to different places in the reactor gap along the first side

and thus assure a uniform distribution of the fuel/oxygen mixture over the width of the reactor gap.

16. A burner element as in claim 15 characterized by the fact that the outlet communicates with several collecting passages which collect the exhaust gases from the reactor or the reaction gap at various places along the second side and feed it to the outflow channel.

17. A burner element as in claim 15 characterized by the fact that the feeder passages and the collecting passages are rectangular in each case and are arranged side by side, that the distance in each case between the mouth of one of the feeder passages and the inlet to the collecting passage lying opposite it is always the same.

18. A burner element as in claim 11 characterized by the fact that the two plates together with the other plate-shaped elements of the fuel processing system of the reformer unit are stacked into a stack and the plates or the other plate-shaped elements are welded together on their four sides to form the stack.

19. A burner element as in claim 7 characterized by the fact that the combustion chamber is subdivided into three structured sections and that on at least one of the opposing third and fourth sides two openings are provided for introduction of air.

20. A heat-emitting burner element for use with at least one processing device conducting an endothermic process of a fuel cell system, e.g., with an endothermic stage of a reformer unit, where the burner element consists of at least two essentially parallel spaced-apart plates characterized by the fact that the plates form between themselves a reaction gap and, as a result o the catalytic combustion of a fuel gas/oxygen mixture there on a catalytic

coating on at least one of the plates facing the reaction gap, generate heat and emit it by radiation, convection and conduction directly through the coated plate(s) to at least one neighboring endothermic stage, that the element is essentially four-sided at least in top view, e.g., square, rectangular or trapezoidal, that the reaction gap is divided by at least one separating wall into at least two slot-like reaction chambers running parallel to each other and that the one reaction chamber displays on a first side of the four-sided element an inlet for the one component of the fuel gas/oxygen mixture while the second reaction chamber on the same side displays an inlet for another component of the fuel gas/oxygen mixture, the openings being provided and designed in the separating wall(s) in order to make an exchange of gases possible in the reaction chambers or a diffusion equalization, while the gases flow from the inlet to an outlet on second side lying opposite the first side.

21. A burner element as in claim 20 characterized by the fact that the fuel gas is preferably introduced into the first slot-like reaction chamber and air is preferably introduced into the second slot-like reaction chamber.

22. A burner element as in claim 21 characterized by the fact that at least one of the plates displays structural elements also having a catalytic coating and extending into the reaction gap and which extend in the direction of flow and consist, for example, of fins or bars.

23. A burner element as in claim 22 characterized by the fact that the plates forming the reaction gap are of wavelike design, with the peaks and valleys forming the wave form in the longitudinal direction extending in the direction of flow of the fuel gases.

24. A catalyst-coated plate for a heat-emitting burner element which consists of two at least essentially parallel plates arranged at a distance

from each other characterized by the fact that the plate in top view is at least essentially four-sided, e.g., square, rectangular or trapezoidal, that on the first and second opposing sides of the four-sided element in each case an inlet region and an outlet region are provided and that the plate displays on the above noted catalyst-covered surface structural elements extending in the direction of flow which elements consist, for example of fins or bars.

25. A plate as in claim 24 characterized by the fact that a device for introducing diluting air transversely to the direction of flow is provided at least in one and preferably in several places along at least one of the opposing third and four sides of the plate.

26. A plate as in claim 24 characterized by the fact that the structural elements are arranged in at least two groups at a distance from each other.

27. A plate as in claim 26 characterized by the fact an air intake site is provided in the spacing region between the groups.

28. A process for controlling the endothermic reforming reactions in a fuel processing system generating a hydrogen-rich synthetic gas which contains at least one burner element in which a fuel/oxygen mixture is introduced into a slot-like reaction chamber, characterized by the fact that control is accomplished at least partially by introducing diluting air into the reaction chamber.

29. A process as in claim 28 characterized by the fact that the control is accomplished by varying the quantity of diluting air fed in.

30. A process for controlling the endothermic reformation reaction in a fuel processing system generating a hydrogen-rich synthetic gas

which contains at least one burner element in which the components of the fuel-oxygen mixture are introduced into slot-like reaction chambers separated by a perforated separating wall and adjacent to one another, characterized by the fact that the control is accomplished by varying the total quantity of the constituents supplied.